ISSN: 2347-5129
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.352
IJFAS 2016; 4(4): 186-189

www.fisheriesjournal.com
Received: 24-05-2016
Accepted: 26-06-2016

Panchakshari V
Department of Zoology & Aquaculture, Acharya Nagarjuna University Nagarjuna Nagar. Andhra Pradesh, India.

Krishna PV
Department of Zoology & Aquaculture, Acharya Nagarjuna University Nagarjuna Nagar. Andhra Pradesh, India.

K Prabhavathi
Department of Zoology & Aquaculture, Acharya Nagarjuna University Nagarjuna Nagar. Andhra Pradesh, India.

Correspondence
Krishna PV
Department of Zoology & Aquaculture, Acharya Nagarjuna University Nagarjuna Nagar. Andhra Pradesh, India.

Strategies and Diet composition of Food and Feeding of Asian seabass *Lates calcarifer* from Krishna Estuarine Region, Andhra Pradesh, India

Panchakshari V, Krishna PV and K Prabhavathi

Abstract
Fishes are the most attractive, nutritional and amazing form of aquatic life. Food is a significant factor in the ecology of fishes and required growth, reproduction and extensive migration. Food and feeding habits of fish is a helpful of fishery biology and culture aspects. The feeding strategies and diet composition of Asian seabass *Lates calcarifer* was observed from Krishna estuarine region during the January, 2014 to December, 2014. There was a preponderance of empty stomach recorded during all the months. Crustaceans (34%) and small fishes (22.0%) were the major components of the food item in the food spectrum of the fishes. Further items were mollusca (13%) and algae (9.5%) and also monthly fluctuations were also observed in the percentage occurrence of stomach with different degrees of fullness. It is evident that higher percentage of fullness of the stomach was recorded in pre-monsoon due to pre-spawning flattening process. The monthly Gastro Somatic index ranged from 2.2 to 5 and higher values were recorded in the month of June.

Keywords: Food and feeding, *Lates calcarifer and* Krishna estuarine region

1. Introduction
Nutrition is one of the essential requisites of living beings in nature for continuance of their vital needs viz., growth and reproduction for survival and thus maintain their kind. Fishes are directly dependent upon their surrounding aquatic environment for their food requirements and are highly adopted in their food and feeding habits, utilizing most of the readily available food. Studies on the food and feeding habits, an important aspect in the biology of fishes, have shown that the requirements at different stages in their life cycle differ with space and time studied by Hardy, 1936. The importance of the knowledge of food and feeding habits of a fish in understanding its biology has been well established. Sometimes the rate of feeding has a bearing on the spawning of fish.

Seasonal and diurnal abundance of different food organisms may influence the movements and migration of fishes. Hence it is very essential to gain an insight into the relationship between the fishes and their food organisms for prediction and exploitation of fish resources. Mookherjii *et al*., (1964) [21] have reported the feeding habits of some fishes on the basis of the presence of maximum percentage of the type of food in the guts of the fishes. Das and Moitra (1963) [3] have observed fishes into herbivores which feed on plant material, carnivores which feed on animal material and omnivores which feed on one or more groups of organisms, i.e., plankton, benthos. The magnitude of fish population in a region is a function of its food potentialities. Food enriches the biochemical components of fishes. Ganapathi and Chacko (1950) [6] have explained that the groups of several fishes are cultivable importance into surface, column and bottom feeders. There are also terms like Piscivorous-feeding mainly on fish, Carnivorous-feeding mainly on crustaceans, Planktivorous-feeding on plankton, Detrivorous-feeding on detritus and Cannibalistic-feeding on their own kind.

Lates calcarifer commonly called as seabass/barramundi is one of the commercially important marine food fishes which also thrive in brackish water and fresh water. It widely distributed in tropical and subtropical waters of the Indo-west pacific (Katayama and Taki, 1984) [13]. These young ones spend of their growing period in fresh water such as rivers, lakes, creeks. Which

are connected to sea but the adults migrates to the sea, where salinity range is 30 to 32% for gonads maturation. Subsequently they spawn according to the lunar cycle and the larvae migrate further upstream for growth. The distribution pattern of different life stages is diverse in various ecosystems such as coastal waters, estuaries, and even in fresh water (Ghosh, 1973) [7]. Kungvankij *et al*., (1986) [17] have reported that *L. calcarifer* is a diadromus species and inhabiting rivers before returning to be estuaries to spawn. Small ones are inhabit the upper reaches of rivers (Allen *et al*., 2002) [1]. Some common habits of *L. calcarifer* are the Bay of Bengal commonly found in estuaries of Krishna and Godavari. Krishna *et al*., (2016) [14] have reported that the Asian seabass is a top predator and thus plays an important role in the controlling population of lower tropic level species including crustaceans, fishes, and polychaete worms some extent. Therefore, knowledge of the feeding habits and ecological interactions of Asian seabass and their prey is essential for the management and conservation of the fishery resources in marine and brackish water ecosystem. The seasonal variations of food items and feeding activities of *Lates calcarifer* in Krishna estuaries are scanty. Therefore, the result of this study provides valuable information for the future studies in the Krishna estuarine region.

2. Materials and Methods

Samples of the present study were collected over a period of two years from different stations of in the Krishna delta lies 15º 49' N and 15º 55' N latitude and 80º 45' to 81º 00' E longitude spread across Krishna and Guntur districts. The data of fish length, weight were recorded. The gut content was dissected and preserved 5% formalin. The content of each stomach was examined using binocular microscope. A weight of the stomach of the individual fish was recorded, based on the fish body weight of the fish. Gastro Somatic index of individual fish was calculated using the following formula.

$$\text{Gastro Somatic index (GSI)} = \frac{Weight\ of\ the\ Stomach}{Weight\ of\ the\ fish}\ X\ 100$$

Gut contents were analyzed both qualitatively and quantitatively (Hynes, 1950) [9]. The volume of food in each gut of fish was measured by Pillay, (1952) [22] and various food items are identified. The food content found in the stomach was divided into five groups.

1. Gorged : Stomach was heavy food
2. Full : Stomach was full with food
3. ½ Full : Stomach was ½ full and slightly distended
4. ¼ Full : Stomach was ¼ food
5. Empty : Stomach without food

Point's method: The degree of apparent fullness of the stomach was determined and point's was assigned. Gorged (1.25), Full (1.00), ½ Full (0.50), ¼ Full (0.25), Empty (0.00).

3. Results and Discussion

The percent total food item contributed to each item for the entire year (Fig: 1) shows that the major component of the diet was crustaceans (34%) and fishes. Among the crustaceans shrimps, crabs and their larvae were identified in fish *Lates calcarifer*. The next major groups are fishes (22.0%) and their larvae followed by molluscs 13%. On the mollusca, the cephalopods like *Loligo* and squilla species are observed. Among the identified algae in the stomach content was Bacillariophyceae. Further observed that the 11% were semidigested and remaining unidentified. The analysis of stomach content of *L. calcarifer* from Krishna estuarine region revealed that this species consumed a variety of food items in this region. The presence of considerable quantities of semi digested matter might be due to rapid digestion that takes place in the tropical waters and the metabolic rate is high (Kalita and Jayabalan, 2000) [11].

Monthly variations are witnessed in the presence of occurrence of stomachs with different degrees of fullness. It is evident that higher percentage of fullness of the stomach was recorded in the month of September and October months and lowest percentage of fullness of stomach in the April and May due to non-availability of food. On the other hand moderately fed stomach is observed through the year. Ferry *et al*., (1997) [5] have reported that the fishes, crustaceans, mollusca and echinodermtes are the main food item for spotted sand bass from Los Angeles Bay in the Gulf of California. Mendoza-Carranaza and Rosales- Casian (2000) [19] have observed food and feeding habits of spotted sand bass (*Paralabrax maculatofsciatur*) for the Punta Banda Estuary, Baja California and found that this fish takes prominently crustaceans, teleostei, eelgrass, molluscs and zooplankton as their food. Krishna (2008) [16] has reported that the snake head fish *Channa punctata* found that 27.06% of fishes were empty stomach,20.42% of fish stomachs are ¼ full, 18.5% of fish stomachs are ½ full, 13.8% stomachs are ¾ full, 12.66% fishes are with full stomachs and 7.47% of stomachs are gorged. In the present study the 31.5% of fish are of empty stomachs, 21.4% were ¼ full, 14.5% were ½ full, 12.5% were ¾ full, 10.5% were full and only 9.6% were gorged stomachs. Varghese and Somvanshi (2016) [23] have observed that the feeding ecology and consumption rates of yellowish fauna *Thunnus albacores* in the eastern Arabia Sea.

Kanna (1993) [12] has stated that the Gastro Somatic index of several species showed seasonal variations and maximum during post spawning period and minimum during breeding season. The maximum GSI recorded 5 in the month of June (Fig.2). The selectivity and preference of the fish to different food items in different habitats give indicators on the flexibility of the species to adjust to diverse environmental conditions. Menzel (1960) [20] has reported that the feeding efficiency and growth rate decreased with increase size. Braga (2012) [2], reported that the feeding ecology of a species is thoroughly linked to its population dynamics, know ledge of the feeding ecology, habit preferences, prey selection, predation evolution, competition and energy transfer within and between ecosystems. EI- Drawany and Elnagar, (2015) [4] have concluded that the stomach content analysis, should be extended to other native fish species so as to provide the scientific information for their management. Krishna (2004) [15] has also reported similar observation in Heteropneustes *fossils.* Interspecific relations between the fish and food organisms are an important clue for the factors underlying seasonal variations in fishery biology. Seasonal and diurnal abundance of food items influences horizontal and vertical migrations of the fish stocks (Krishna, 2008) [16]. Jambo and Maduko, (2015) [10] have reported that the food and feeding habit of *Mugil cephalus* in Niger delta, was fish larvae, crustaceans, insect parts annelids and other plant material along with sand particles. Manojkumar *et al*., (2015) [18] have concluded that *Nemipterus japonicus* from Malabar Coast, the fish is a demorsal carnivorous and the diet consisted of fishes, crustaceans, molluscs, polychaetes and miscellaneous food

items. In our results also shows that the fish *L. calcarifer* is a carnivorous and diet containing crustaceans, fish larvae, and molluscs are the major food items.

Biological aspects like growth and maturity are important from the management point of view are better understood in the light of adequate knowledge about food and feeding habits of fish. An understanding of the relationship between fishes and their food organisms especially the preferential food items and their distribution may help to locate the potential feeding grounds and environmental protection has attracted the attention of the wide section of the people all over the world and now it has become global issue among the scientists working in this area. Unfortunately, several pollutants are being regularly discharged in large quantities into the environment especially into the aquatic environment even some of them are unknown and unidentified, but it must be affecting the biota. The present study concluded that the food and feeding of *L. calcarifer* is voracious feeders, feeding on the all groups with higher preference of crustaceans, fish larvae. This study has also thrown light on the role of feeding intensity with spawning and importance role of *L. calcarifer* in the food chain. This information is important particularly in developing an ecosystem-based approach for fishery management along Krishna estuarine region.

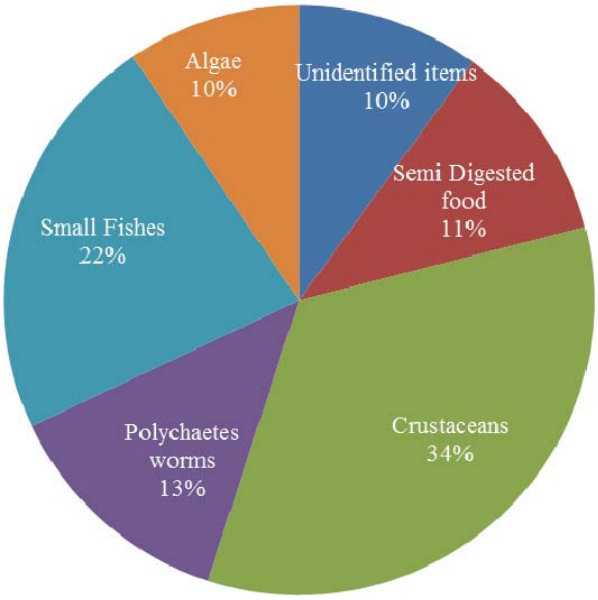

Fig 1: Index of preponderance of food items for *Lates calcarifer*

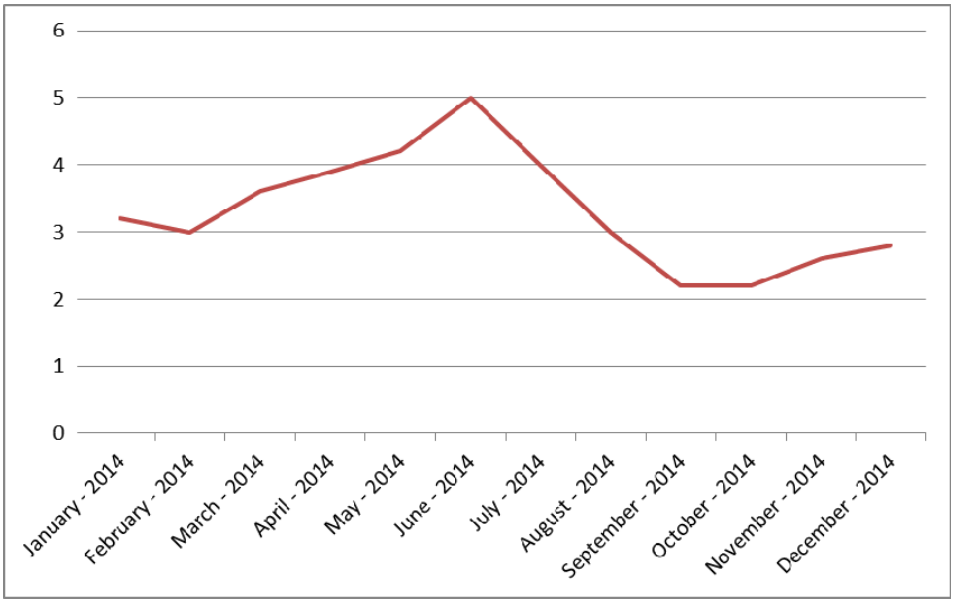

Fig 2: Monthly variations in the Gastro-Somatic index of *Lates calcarifer*

4. References

1. Allen GR, Midgley SH, Allen M. Field guide to the freshwater fishes of Australia. Western Australian Museum, Perth, Western Australia. 2002, 394.
2. Braga RR, Bornatowski H, Vitule JRS. Feeding ecology of fishes: an overview of worldwide publications. Rev. in Fish Biol. and Fish. 2012; 22:915-929.
3. Das SM, Moitra SK. Studies on the food and feeding habits of some freshwater fishes of India. IV. A review on the food and feeding habits of 24 freshwater fishes, with general conclusions. *Ichthyologica.* 1963; 2(1-2):107-115.
4. El-Drawany MA, Elnagar WG. Growth, Food and Feeding Habits of Bagrus bayad and Bagrus docmac Inhibiting Muess Channel, Sharkia Province, Egypt. J Aquac Res Development. 2015; 6(7):348-355.
5. Ferry LA, Clark SL, Calliet GM. Food habits of spotted sand bass from the Los-Angeles, Baja California. South. Calif. Acad. Sci. 1997; 16(1):1-17.
6. Ganapati SV, Chacko PI. Suggestions for stocking fish ponds in Madras. Agric J. 1950; 37(15):6.
7. Ghosh A. Observations on the larvae and juveniles of the Bhetki Lates *calcarifer* (Bloch) from the Hoogly-Matlah estuaries system. I.J.F. 1973; 20(2):372-379.
8. Hardy AE. The ecological relation between the herring and the plankton investigated with plankton indicator. J Mar Biol Ass U.K. 1936; 21:147-291.
9. Hynes HBN. The food of freshwater stickleback with a review of the methods used in studies of fishes. J Anim Ecol. 1950; 19:41-57.
10. Jambo NA, Maduako NC. Food and feeding habits of *Mugil cephalus* [Linnaeus, 1758] in Elechi Creek, Niger Delta. Nigeria. Inter. Jour of Fish and Aqua. 2015;

7(3):25-29.
11. Kalitha B, Jayabalan N. Food and feeding habits of the golden scad *Caranx kalla* (Cuv. and Val.) along the Mangalore coast. Environ. and Ecol. 2000; 18:869-873.
12. Kanna SS. An introduction to fishes. Central Book Dept. Allahabad. 1993.
13. Katayama M, Taki Y. *Lates japonicas*, a new centropomid fish from Japan. J Jour of Ichthy. 1984; 30:361-367.
14. Krishna PV, Panchakshari V, Prabhavathi K. Feeding Habits and Stomach Contents of Asian seabass *Lates calcarifer* from Nizampatnam Coast, Andhra Pradesh, India. Inter. Jour of Adva Res. 2016; 4(4):168-172.
15. Krishna PV. Food and feeding habit of *Heteropneustes fossils* (Bloch) from ponds in Guntur A.P. J Aquacult. 2004; 5:97-100.
16. Krishna PV. Food spectrum of spotted Murrel *Channa punctata* from Repalle area Guntur District, Andhra Pradesh. Aquacult, 2008; 9(1):83-88.
17. Kungvankij P, Pudadera BJ, Tiro JRLB, Potestas IO. Biology and culture of sea bass (*Lates calcarifer*), NACA training manual series No. 3, Bangkok, Thailand. 1986; 70.
18. Manojkumar PP, Pavithran PP, Ramachandran NP. Food and feeding habits of *Nemipterus japonicus* (Bloch) from Malabar coast, Kerala Indian J Fish. 2015; 62(1):64-69.
19. Mendoza-Carranaza M, Rosales-Casian JA. The feeding habits of Spotted sand bass *(Paralabrax maculatofaciatus)* in Punta banda estuary, Ensenada, Baja California, Mexico. CalCOFl Rep. 2000; 41:194-199.
20. Menzel DW. Utilization of food by a Bermuda reef fish *Epinepholus guttatus.* J Conseil Internatnb Explor Mer. 1960; 25(2):216-222.
21. Mookerjee HK, Sen Gupta SN, Roy Chowdhury PK. Food and its percentage composition of the common adult food fishes of Bengal. Sci. & Cult. 1964; 12:247-49.
22. Pillay T. A critique of the methods of study of food of fishes. J Zool Soc India. 1952; 4(2):185-200.
23. Varghese SP, Somvanshi VS. Feeding ecology and consumption rates of yellowfin tuna *Thunnus albacares* (Bonnaterre, 1788) in the eastern Arabian Sea. Indian J Fish. 2016; 63(1):16-26.